

REMARKS/ARGUMENTS

Applicant has carefully reviewed and considered the Office Action mailed on December 8, 2006, and the references cited therewith.

Claims 1, 18, 37, and 48 are amended, claims 3, 19, and 57 are canceled, claims 21-36, and 45-47 are withdrawn, and no claims are added; as a result, claims 1-2, 4-18, and 20-56 are now pending in this application.

Objection to Title

The Examiner stated that the current title of the invention is not descriptive. A new title was requested by the Examiner in order to clearly indicate the invention to which the claims are directed. The following title was suggested: "Transistor with Multiple Component Oxide Channel". Applicant thanks the Examiner for the title suggestion.

Applicant respectfully submits that the present title "Semiconductor Device" is as "short and specific as possible" and is "clearly indicative of the invention to which the claims are directed." (per MPEP sections 606 and 606.01). All of the independent claims under consideration recite "semiconductor device" in the preamble (i.e., independent claims 1, 18, and 37) or in the first element (i.e., independent claim 48). As such, Applicant respectfully submits that the title as presently recited is "short and specific" while also being "clearly indicative of the invention to which the claims are directed."

Reconsideration and withdrawal of the title objection is respectfully requested.

Claim Objections

Claims 1, 18, 37 and 48 were objected to. Claims 1, 18, 37 and 48 contain the limitations "each A is selected from the group of Ga, In, each B is selected from the group of Ge, Sn, Pb" and "each of A and B are different". In view of the first limitation the latter limitation does not further limit the claims and the Examiner suggests that it (the latter limitation) be removed from the claims.

Applicant has amended independent claims 1, 18, 37 and 48 as suggested by the Examiner.

§ 112 Rejection of the Claims

Claims 1-20, 37-44, and 48-57 were rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Applicant respectfully traverses the rejection as follows.

Applicant gratefully acknowledges that the Examiner will examine claims 1-20, 37-44, and 48-57 as presently recited. Applicant respectfully notes that “each x is independently a non-zero number” is recited in independent claims 1, 18, 37, and 48, as currently amended.

Applicant respectfully notes that the specification of the present application as originally presented supports, and clarifies, “each x is independently a non-zero number”. For example, the specification recites, “the subscripts are intended to denote the number of atoms of the metal cation selected from the defined group.” (Page 6, lines 19-20). Further, the specification goes on to recite, “each x can be independently a non-zero integer” and that “the value of “x” for each of the constituent elements may be different.” (Page 7, lines 23-25).

As such, Applicant respectfully submits that the intent of the element “each x is independently a non-zero number” will be appreciated by one of ordinary skill in the relevant art. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the 112 rejection of claims 1-20, 37-44, and 48-57, as currently amended.

Claims 2, 5, 7, 9, 11, 13, 15, 17, 50, 52, 54, and 56 were rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Applicant respectfully traverses the rejection as follows.

Applicant gratefully acknowledges that the Examiner will examine claims 2, 5, 7, 9, 11, 13, 15, 17, 50, 52, 54, and 56 as presently recited. Applicant respectfully notes that the specification of the present application as originally presented supports, and clarifies, claim recitations such as, for example, “the formula $A_xB_xO_x$ includes a ratio of A:B, wherein A, and B, are each in a range of about 0.05 to about 0.95”, as recited in dependent claim 2. For example, the specification recites on page 8, lines 1-5:

That is, the channel according to this embodiment can include various two-component oxide semiconductor films having atomic composition ratios with the relative concentration of each component falling within the range of about 0.05 to about 0.95.

The specification also recites, “the subscripts are intended to denote the number of atoms of the metal cation selected from the defined group.” (Page 6, lines 19-20).

As such, Applicant respectfully submits that the intent of claim recitations such as, for example, “the formula $A_xB_xO_x$ includes a ratio of A:B, wherein A, and B, are each in a range of about 0.05 to about 0.95”, as recited in dependent claim 2, will be appreciated by one of ordinary skill in the relevant art. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the 112 rejection of claims 2, 5, 7, 9, 11, 13, 15, 17, 50, 52, 54, and 56.

Claim 18 was rejected under 35 USC § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

Applicant has amended independent claim 18 to provide proper antecedent basis by reciting “a channel”. As such, Applicant respectfully requests reconsideration and withdrawal of the 112 rejection of independent claims 1, 18, 37 and 48, as currently amended.

§ 102 Rejection of the Claims

Claims 1, 2, 4, 5, 18, 20, 37 and 41-44 were rejected under 35 USC § 102(b) as being anticipated by Hamada et al. (Japan Patent No. JP405251705A) with

evidence provided by Chen et al. (U.S. Publ. No. 2005/0037237). Applicant respectfully traverses the rejection as follows.

Applicant's independent claim 1, as amended, presently recites:

a channel contacting the drain electrode and the source electrode, wherein the channel includes one or more compounds of the formula $A_xB_xO_x$, wherein each A is selected from the group of Ga, In, each B is selected from the group of Ge, Sn, Pb, each O is atomic oxygen, each x is independently a non-zero number, wherein the channel includes one of an amorphous form and a mixed-phase crystalline form;

Applicant's independent claim 18, as amended, presently recites:

means for controlling current flow electrically coupled to the drain electrode and the source electrode, wherein the means for controlling current flow includes one or more compounds of the formula $A_xB_xO_x$, wherein each A is selected from the group of Ga, In, each B is selected from the group of Ge, Sn, Pb, each x is independently a non-zero number, wherein the channel includes one of an amorphous form and a mixed-phase crystalline form;

In addition, Applicant's independent claim 37, as amended, presently recites:

providing a precursor composition including one or more precursor compounds that include A_x and one or more compounds that include B_x , wherein each A is selected from the group of Ga, In, each B is selected from the group Ge, Sn, Pb, each x is independently a non-zero number, wherein the channel includes one of an amorphous form and a mixed-phase crystalline form;

From Applicant's review of the Hamada and Chen references, the references do not describe, "wherein the channel includes one of an amorphous form and a mixed-phase crystalline form".

As such, Applicant respectfully submits that each and every element and limitation of independent claims 1, 18, and 37, as amended, is not present in the Hamada and Chen references. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the 102 rejection of independent claims 1, 18, and 37, as well as those claims that depend therefrom.

§103 Rejection of the Claims

Claims 6, 7, 8, 9 and 38 were rejected under 35 USC § 103(a) as being unpatentable over Hamada et al. (Japan Patent No. JP405251705A) in view of Phillips et al. ("Transparent Conducting Thin Films of GaInO_3 ", Appl. Phys. Let. Vol. 65 (1), July 1994) with evidence provided by Chen et al. (U.S. Publ. No. 2005/0037237). Applicant respectfully traverses the rejection as follows.

Claims 6-9 and 38 depend from independent claims 1 and 37, respectively. For the reasons provided above, Applicant submits that independent claims 1 and 37, as amended, are in condition for allowance.

From Applicant's review of the Phillips reference, the reference does not cure the deficiencies of the Hamada and Chen references. That is, the Phillips reference does not describe, teach, or suggest, "wherein the channel includes one of an amorphous form and a mixed-phase crystalline form", as recited in independent claims 1 and 37, as amended. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the 103 rejection of dependent claims 6-9 and 38.

Claims 10-13 and 39 were rejected under 35 USC § 103(a) as being unpatentable over Hamada et al. (Japan Patent No. JP405251705A) in view of Phillips et al. ("Transparent Conducting Thin Films of GaInO_3 ", Appl. Phys. Let. Vol. 65 (1), July 1994) further in view of Minami ("Transparent and Conductive Multicomponent Oxide films prepared by magnetron sputtering", Minami, J. Vac. Sci. Technol. A 17(4), Jul/Aug 1999) with evidence provided by Chen et al. (U.S. Publ. No. 2005/0037237). Applicant respectfully traverses the rejection as follows.

Claims 10-13 and 39 depend from independent claims 1 and 37, respectively. For the reasons provided above, Applicant submits that independent claims 1 and 37, as amended, are in condition for allowance.

From Applicant's review of the Minami reference, the reference does not cure the deficiencies of the Hamada, Phillips, and Chen references. That is, the Minami reference does not describe, teach, or suggest, "wherein the channel includes one of an amorphous form and a mixed-phase crystalline form", as recited

in independent claims 1 and 37, as amended. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the 103 rejection of dependent claims 10-13 and 39.

Claims 14-17 and 40 were rejected under 35 USC § 103(a) as being unpatentable over Hamada et al. (Japan Patent No. JP405251705A) in view of Phillips et al. ("Transparent Conducting Thin Films of GaInO_3 ", Appl. Phys. Lett. Vol. 65 (1), July 1994) further in view of Minami ("Transparent and Conductive Multicomponent Oxide films prepared by magnetron sputtering", Minami, J. Vac. Sci. Technol. A 17(4), Jul/Aug 1999) further in view of D ("Transparent Conducting PbO_2 films prepared by activated reactive evaporation", Phys. Rev. B 33, 2660-2664 (1986)) with evidence provided by Chen et al. (U.S. Publ. No. 2005/0037237). Applicant respectfully traverses the rejection as follows.

Claims 14-17 and 40 depend from independent claims 1 and 37, respectively. For the reasons provided above, Applicant submits that independent claims 1 and 37, as amended, are in condition for allowance.

From Applicant's review of the D reference, the reference does not cure the deficiencies of the Hamada, Phillips, Minami, and Chen references. That is, the D reference does not describe, teach, or suggest, "wherein the channel includes one of an amorphous form and a mixed-phase crystalline form", as recited in independent claims 1 and 37, as amended. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the 103 rejection of dependent claims 14-17 and 40.

Claims 48-50 were rejected under 35 USC § 103(a) as being unpatentable over Akimoto (U.S. Pat. No. 6,476,788) in view of Hamada et al. (Japan Patent No. JP405251705A) with evidence provided by Chen et al. (U.S. Publ. No. 2005/0037237). Applicant respectfully traverses the rejection as follows.

Applicant's independent claim 48, as amended, presently recites:

a channel contacting the drain electrode and the source electrode, wherein the channel includes one or more compounds of

the formula $A_xB_xO_x$, wherein each A is selected from the group of Ga, In, each B is selected from the group of Ge, Sn, Pb, each O is atomic oxygen, each x is independently a non-zero number, wherein the channel includes one of an amorphous form and a mixed-phase crystalline form;

From Applicant's review of the Akimoto, Hamada, and Chen references, the references do not describe, teach, or suggest, either individually or in combination, "wherein the channel includes one of an amorphous form and a mixed-phase crystalline form". Accordingly, Applicant respectfully requests reconsideration and allowance of independent claim 48, as amended, as well as those claims that depend therefrom.

Claims 51 and 52 were rejected under 35 USC § 103(a) as being unpatentable over Akimoto (U.S. Pat. No. 6,476,788) in view of Hamada et al. (Japan Patent No. JP405251705A) further in view of Phillips et al. ("Transparent Conducting Thin Films of $GaInO_3$ ", Appl. Phys. Let. Vol. 65 (1), July 1994) with evidence provided by Chen et al. (U.S. Publ. No. 2005/0037237). Applicant respectfully traverses the rejection as follows.

Claims 51-52 each depend from independent claim 48. For the reasons provided above, Applicant submits that independent claim 48, as amended, is in condition for allowance.

From Applicant's review of the Phillips reference, the reference does not cure the deficiencies of the Akimoto, Hamada, and Chen references. That is, the Phillips reference does not describe, teach, or suggest, "wherein the channel includes one of an amorphous form and a mixed-phase crystalline form", as recited in independent claim 48, as amended. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the 103 rejection of dependent claims 51-52.

Claims 53 and 54 were rejected under 35 USC § 103(a) as being unpatentable over Akimoto (U.S. Pat. No. 6,476,788) in view of Hamada et al. (Japan Patent No. JP405251705A) further in view of Phillips et al. ("Transparent

Conducting Thin Films of GaInO_3 ”, Appl. Phys. Let. Vol. 65 (1), July 1994) further in view of Minami (“Transparent and Conductive Multicomponent Oxide films prepared by magnetron sputtering”, Minami, J. Vac. Sci. Technol. A 17(4), Jul/Aug 1999) with evidence provided by Chen et al. (U.S. Publ. No. 2005/0037237).

Applicant respectfully traverses the rejection as follows.

Claims 53-54 each depend from independent claim 48. For the reasons provided above, Applicant submits that independent claim 48, as amended, is in condition for allowance.

From Applicant’s review of the Minami reference, the reference does not cure the deficiencies of the Akimoto, Hamada, Phillips, and Chen references. That is, the Minami reference does not describe, teach, or suggest, “wherein the channel includes one of an amorphous form and a mixed-phase crystalline form”, as recited in independent claim 48, as amended. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the 103 rejection of dependent claims 53-54.

Claims 55 and 56 were rejected under 35 USC § 103(a) as being unpatentable over Akimoto (U.S. Pat. No. 6,476,788) in view of Hamada et al. (Japan Patent No. JP405251705A) further in view of Phillips et al. (“Transparent Conducting Thin Films of GaInO_3 ”, Appl. Phys. Let. Vol. 65 (1), July 1994) further in view of Minami (“Transparent and Conductive Multicomponent Oxide films prepared by magnetron sputtering”, Minami, J. Vac. Sci. Technol. A 17(4), Jul/Aug 1999) further in view of D (“Transparent Conducting PbO_2 films prepared by activated reactive evaporation”, Phys. Rev. B 33, 2660-2664 (1986)) with evidence provided by Chen et al. (U.S. Publ. No. 2005/0037237). Applicant respectfully traverses the rejection as follows.

Claims 55-56 each depend from independent claim 48. For the reasons provided above, Applicant submits that independent claim 48, as amended, is in condition for allowance.

From Applicant’s review of the D reference, the reference does not cure the deficiencies of the Akimoto, Hamada, Phillips, Minami, and Chen references. That

is, the D reference does not describe, teach, or suggest, “wherein the channel includes one of an amorphous form and a mixed-phase crystalline form”, as recited in independent claim 48, as amended. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the 103 rejection of dependent claims 55-56.

Claims 3 and 19 were rejected under 35 USC § 103(a) as being unpatentable over Hamada et al. (Japan Patent No. JP405251705A) in view of Wagner (“Transparent Electronics”, Science, Vol. 300 (2003)) with evidence provided by Chen et al. (U.S. Publ. No. 2005/0037237). Applicant respectfully traverses the rejection as follows.

Dependent claims 3 and 19 have been canceled. However, Applicant respectfully notes that the Hamada, Wagner, and Chen references, either individually or in combination, do not describe, teach, or suggest, “wherein the channel includes one of an amorphous form and a mixed-phase crystalline form”, as recited in independent claims 1 and 18, as amended, from which claims 3 and 19 formerly depended, respectively.

Claim 57 was rejected under 35 USC § 103(a) as being unpatentable over Akimoto (U.S. Pat. No. 6,476,788) in view of Hamada et al. (Japan Patent No. JP405251705A) in view of Wagner (“Transparent Electronics”, Science, Vol. 300 (2003)) with evidence provided by Chen et al. (U.S. Publ. No. 2005/0037237). Applicant respectfully traverses the rejection as follows.

Dependent claim 57 has been canceled. However, Applicant respectfully notes that the Akimoto, Hamada, Wagner, and Chen references, either individually or in combination, do not describe, teach, or suggest, “wherein the channel includes one of an amorphous form and a mixed-phase crystalline form”, as recited in independent claim 48, as amended, from which claim 57 formerly depended.

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney Gregg W. Wisdom at (360) 212-8052 to facilitate prosecution of this matter.

At any time during the pendency of this application, please charge any additional fees or credit overpayment to the Deposit Account No. 08-2025.

CERTIFICATE UNDER 37 CFR §1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: **MS AMENDMENT** Commissioner for Patents, P.O. BOX 1450, Alexandria, VA 22313-1450 on this 6th day of March, 2007.

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Date: 3/6/2007